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ABSTRACT

Block scheduling has grown rapidly in recent years. In North Carolina, 77 schools started block scheduling in 1995-96, bringing the total number of blocked schools in the state to 207. A previous evaluation compared 1995 End-of-Course (EOC) Test scores for block-scheduled (blocked) and nonblocked schools. This report presents results of the analysis of 1996 EOC data for five core subjects: English I; Algebra I; Economics, Legal, and Political Systems; Biology; and U.S. History. Analysis of the EOC data does not change previous conclusions that there are essentially no significant differences between groups of blocked and corresponding nonblocked schools in terms of student performance on state EOC tests. There are also no significant differences among groups of schools blocked for different numbers of years. While the overall picture is one of equivalence, after adjusting for starting point and parent education level, scores for blocked schools were higher in English, Biology, and U.S. History in 1994, and scores on all five EOC tests were higher for 1995. Only U.S. History was significantly higher for 1996 EOC tests. More data points will be needed to determine if the lower scores for 1996 represent a trend or a fluctuation. (SLD)

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Evaluation brief

May, 1997

Block Scheduled High School Achievement: Part II

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Public Schools of North Carolina

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Evaluation brief

Public Schools of North Carolina . State Board of Education . Jay Robinson, Chairman
Department of Public Instruction . Michael E. Ward, State Superintendent

May, 1997

Block Scheduled High School Achievement: Part II

Comparison of End-of-Course Test Scores for Blocked and Nonblocked High Schools (1993 through 1996)

Growth in the Semester Block Schedule

Block scheduling has grown rapidly in recent years. Seventy-seven (77) more schools started block scheduling in 1995-96 (see Table 1). In this study, block scheduling refers to the semester or 4x4 schedule in which four courses are taught each semester, for a total of eight in one school year.

Table 1. Number of Schools by Type of Schedule: 1993-96

School Year	Number Schools Not Blocked	Number Schools Blocked	Percent Blocked
1992-93	365	6	1.62%
1993-94	334	37	9.97%
1994-95	241	130	35.04%
1995-96	164	207	55.80%

Evaluation Results in Brief

In the Fall, 1996 *Evaluation Brief* - **Block Scheduled High School Achievement: Comparison of 1995 End-of Course Test Scores for Blocked and Nonblocked High Schools** - we compared 1995 End-of-Course (EOC) Test scores for blocked and nonblocked high schools. We reported that: (1) Students in block scheduled high schools have EOC Test scores at least equal to students in nonblocked schools; (2) After adjustment for Parent Education Level and scores prior to starting block scheduling, block scheduled schools showed significantly higher 1995 scores than nonblocked schools in almost all major subjects; and (3) The number of years in a blocked schedule is not related to higher EOC Test scores.

The 1996 EOC Test data for five core subjects have now been analyzed as well. Overall, there are few significant differences on EOC Tests between groups of block scheduled schools and corresponding groups of nonblocked schools. There are also no significant differences among school groups using block scheduling for different numbers of years.

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Data Analysis Procedures

EOC scores for block and nonblock scheduled schools were compared for schools starting block scheduling each year from 1993 through 1996. In addition, the EOC scores for the cumulative total of schools blocked and nonblocked each year were also analyzed.

Subjects and Schools Included: Starting in 1995-96, only five core subject EOC tests were administered: English 1 (E1); Algebra 1 (A1); Economics, Legal, Political Systems (ELP); Biology (BI); and US History (USH). Schools with some combination of grades 9, 10, 11, and/or 12 were included in this study. Alternative and special schools were eliminated. Any school with 15 or fewer students taking a given EOC Test was eliminated from the analysis for that course. Schools were then grouped by "blocked" and "nonblocked" status.

Comparison of the Mean T-Scores: Since types of scores used in EOC Tests have changed over the years, all EOC scores were converted to a common scale - standard T-scores - for meaningful comparison. T-scores have a mean of 50 and a standard deviation of 10. Each school's mean T-score for a course is the unit used for comparisons made in this study.

Analysis of variance (ANOVA) was used to compare mean T-scores between the two groups (blocked vs. nonblocked). Results are shown in Table 3. The columns show data for different test years. The rows show tests for various subjects, grouped by the year in which groups of schools started the block schedule. For example, rows in Section I contain data for schools starting block scheduling in 1993; Section II contains data for schools starting block scheduling in 1994; Section III for 1995 and Section IV for 1996. Section V compares scores for the cumulative total of schools in block and nonblock scheduled groups, with the 1996 EOC Test columns (far right) including all schools blocked or nonblocked by 1995-96.

Comparison of Adjusted Scores for Differences in "Starting Point" and Parent Education Level: From a practical point of view, we know that a school's performance prior to block scheduling likely will influence EOC Test scores regardless of the schedule used, as might the socio-economic status (SES) of the school. Parent Education Level (PEL), reported on the student answer sheets, was used as a proxy measure for SES. The scores of schools prior to beginning block scheduling are called the "starting point." To calculate the starting point, the scores for a given subject for all years from 1993 through the year *prior* to block scheduling were averaged. Thus, for comparison of schools starting block scheduling in 1994 and the corresponding nonblocked schools, the 1993 EOC test score was used as the starting point. For comparison of schools starting block scheduling in 1995 and corresponding nonblocked schools, the average of 1993 and 1994 EOC Test scores was used as the starting point. Similarly, for those schools starting block scheduling in 1996, the average of 1993, 1994, and 1995 EOC Test scores was used as the starting point.

Thus, PEL and Starting Point were used as covariates, or as adjustments to, the average scores for all schools. Analysis of Covariance (ANCOVA) was conducted to statistically control for the starting point and PEL. The ANCOVA was conducted to adjusted EOC Test scores for 1994 to 1996. As there were only six schools blocked in 1993 and 1992 EOC Test data were not available, we did not conduct ANCOVA for 1993 EOC Tests. The comparison matrix is shown in Table 4.

The adjustment of scores for PEL and starting point makes conceptual sense and also was justified from a statistical point of view. A better statistical model is found when more of the "variance" between two groups can be accounted for based on specified variables. Without using any statistical control or adjustment, the ANOVA showed a very high percentage of error. It only accounted for 0.10% to 4.40% of the total variance (i.e., difference in the scores between the two groups) in 100 analyses of 5 subjects. The use of the previous years' EOC Test scores as a covariate (ANCOVA) improved the statistical model. It greatly reduced the error, accounting for 50% to 68% of total variance. Furthermore, after PEL was added as second covariate, the model was further improved significantly and accounted for 54% to 74% of total variance.

Comparison for Years Spent in Block Scheduling: The relationship between the number of years a school had been in a block schedule and the EOC Test scores was examined.

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Starting Point and PEL:

In the Fall 1996 report, we noted that lower performing schools might be moving to block scheduling more frequently than high performing schools. To further check this hypothesis, the starting point and the PEL between block and nonblock scheduled groups were compared. Results are showed in Table 2.

Blocked vs. Nonblocked Schools

Comparison began with 1994. A score of "0" means no difference between the two groups. A negative score means the blocked schools were lower as a group than the nonblocked schools. With the exception of starting point for two subjects in 1994, all comparisons were lower for blocked scheduled schools than nonblocked schools. Thus, it appears that lower SES and lower performing high schools have moved to block scheduling more rapidly than higher performing schools.

Table 2. Comparison of Starting Point and Parent Education Level -- Blocked School Group (B) to Nonblocked School Group (NB)

Subject	Prior Starting Point: Mean EOC Test Score			Parent Education Level: Mean Rating		
	94B-94NB	95B-95NB	96B-96NB	94B-94NB	95B-95NB	96B-96NB
A1	-0.27	-0.91	-0.89	-0.35	-0.39	-0.34
E1	0.10	-0.93	-0.55	-0.39	-0.41	-0.26
ELP	0.00	-0.83	-0.73	-0.33	-0.38	-0.28
BI	-0.70	-1.26	-0.91	-0.19	-0.38	-0.33
USH	-0.29	-1.28	-1.23	-0.28	-0.35	-0.35

EOC Test Results:

Blocked vs. Nonblocked Schools

Comparison of EOC Mean T-Scores without Adjustment (Table 3): If there were no difference between the two groups (blocked and nonblocked), the number in the "Difference" column in Table 3 would be "0". Positive numbers mean the comparison favors blocked schools; negative numbers favor nonblocked schools. Statistically significant differences are noted by one or two asterisks, .05 and .01 levels respectively. For 100 comparisons between blocked groups and nonblocked groups across five subjects, the following results were found: (1) All three blocked groups (starting in 1994, 1995, and 1996) had lower "starting point" scores than nonblocked groups. (2) After block, the 1993 blocked group had mostly higher scores on EOC Tests from 1993 to 1996. (3) The 1994 blocked group had mostly higher scores on 1994 and 1995 EOC Tests, but lower scores on 1996 EOC tests. (4) The 1995 blocked group had mixed results in 1995 and lower scores on 1996 EOC tests. (5) The 1996 blocked group had lower scores on all 1996 EOC tests. (6) In analyzing the cumulative totals (Section V), blocked and nonblocked schools were equally split between higher and lower scores on 1993, 1994, and 1995 EOC Tests; however blocked schools had lower scores on 1996 EOC Tests. Only a few of the differences in Table 3 were significant. Since these ANOVAs had a high percentage of error, differences only were reported and no further inference was made.

Comparison of EOC Mean T-Scores with Adjustment for Starting Point and Parent Education Level (Table 4): The ANCOVA for 5 subjects yielded 45 comparisons of blocked and nonblocked groups. The following results were found: (1) The 1994 blocked group had almost all higher scores on 1994, 1995, and 1996 EOC Tests. More than half of the differences are significantly higher. (2) The 1995 blocked group had all significantly higher scores in 5 subjects on 1995 EOC Tests, and all non-significantly higher scores in 1996 EOC Tests. (3) The 1996 blocked group had mostly higher, but non-significant, scores on 1996 EOC Tests. (4) In 1994, the total of blocked schools had three significantly higher scores (E1, BI, and USH). (5) In 1995, the total of blocked schools had all significantly higher scores. (6) In 1996, all blocked schools had higher scores, with only one (USH) being significant.

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EOC Results:

Number of Years in Block Scheduling

Comparison of EOC Mean T-Scores among blocked groups with different lengths of time in block scheduling (Table 5 & 6): Because of the short length of time that most schools have been on the block schedule, differences are for schools that have been blocked from one to three years. (1) Without adjustment for starting point and PEL, there were 17 higher (3 lower) scores for schools blocked for a longer time, but none of them were significant. (2) With adjustment, there were 14 higher (6 lower) scores for schools blocked for a longer time, and two of them in USH were significant.

Summary and Discussion

After analyzing the 1996 EOC Test data, the overall findings did not change previous conclusions. At present, there are essentially no significant differences between groups of blocked and corresponding nonblocked school groups in terms of student performance in state EOC Tests. There are also no significant differences among groups of schools blocked for different numbers of years.

- Overall, students in block and nonblock scheduled schools have equivalent EOC Test scores.

  The overall picture is one of equivalence, with higher scores for students in blocked schools in some subjects some years, and lower scores in other subjects other years; except in 1996 where lower scores occurred in all five core courses.

- After adjustment, block scheduled schools show significantly higher 1994 and 1995 scores than nonblocked schools in most of five major subjects.

  After adjusting for starting point and PEL, the scores for blocked schools on three courses -- English 1, Biology, and US History -- were significantly higher for blocked schools on the 1994 EOC Tests; all five core courses – English 1, Algebra 1, ELP, Biology, and US History – were significantly higher for blocked schools on the 1995 EOC Tests; and only US History was significantly higher for blocked schools on 1996 EOC Tests.

- More data points over time are needed to determine if the lower unadjusted scores on the 1996 EOC Tests for blocked groups are a fluctuation or a trend.

  As noted above, the *unadjusted* 1996 EOC Test scores for the block scheduled school groups went down somewhat compared to 1995 and 1994 scores for all schools starting block scheduling in 1994 or after. On *adjusted* mean scores, however, blocked groups were still higher than nonblocked groups, but differences were not statistically significant. These lower scores for 1996 might be a random fluctuation or a trend, but more data over time are necessary to make that determination.

- At present, length of time in a block schedule is still not related to students EOC scores.

  There were essentially no significant differences on EOC scores between high schools using block scheduling for a different number of years. The lack of significant differences might not mean that the time accumulation is not important. It is possible that three years is not yet a critical point. More data points for EOC Test data are necessary to determine if changes occur with increased time.

Table 3: Comparison of EOC Test Mean T-Scores
for Block Scheduled and Nonblock Scheduled Schools
(without Adjustment)

COURSES	EOC Test 1993			EOC Test 1994			EOC Test 1995			EOC Test 1996		
	Block	Non block	Difference (B - NB)	Block	Non block	Difference (B - NB)	Block	Non block	Difference (B - NB)	Block	Non block	Difference (B - NB)
SECTION I	Block Started in 93											
E1	51.12	50.42	0.70	52.55	50.31	2.24	51.40	49.92	1.48	50.31	50.16	0.15
A1	47.21	48.52	-1.31	48.64	48.54	0.10	48.70	48.34	0.36	48.36	48.64	-0.28
ELP	50.71	50.19	0.52	51.12	50.16	0.96	50.48	49.76	0.72	50.13	50.12	0.01
BI	49.81	50.59	-0.78	50.72	50.37	0.35	50.88	50.03	0.85	50.37	50.35	0.02
USH	48.02	50.54	-2.52	51.42	50.22	1.20	50.22	49.98	0.24	49.34	50.26	-0.92
SECTION II	Before Block			Block Started in 94								
E1	50.15	50.42	-0.27	51.04	50.31	0.73	50.08	49.92	0.16	49.75	50.16	-0.41
A1	48.62	48.52	0.10	47.99	48.54	-0.55	48.82	48.34	0.48	48.49	48.64	-0.15
ELP	50.20	50.19	0.01	50.49	50.16	0.33	50.52	49.76	0.76	50.10	50.12	-0.02
BI	49.88	50.59	-0.71	50.63	50.37	0.26	49.65	50.03	-0.38	49.88	50.35	-0.47
USH	49.25	50.54	-1.29	50.32	50.22	0.10	50.33	49.98	0.35	50.16	50.26	-0.10
SECTION III	Before Block						Block Started in 95					
E1	49.67	50.42	-0.75	49.24	50.31	-1.07	49.70	49.92	-0.22	49.20	50.16	-0.96
A1	47.81	48.52	-0.71	47.39	48.54	-1.15	48.62	48.34	0.28	47.55	48.64	-1.09
ELP	49.20	50.19	-0.99	49.48	50.16	-0.68	50.08	49.76	0.32	49.15	50.12	-0.97
BI	49.22	50.59	-1.37	49.23	50.37	-1.14	49.74	50.03	-0.29	49.21	50.35	-1.14
USH	49.19	50.54	-1.35	49.02	50.22	-1.20	49.39	49.98	-0.59	49.04	50.26	-1.22
SECTION IV	Before Block									Block Started in 96		
E1	49.21	50.42	-1.21	49.41	50.31	-0.90	49.32	49.92	-0.60	49.08	50.16	-1.08
A1	48.40	48.52	-0.12	47.84	48.54	-0.70	47.52	48.34	-0.82	47.67	48.64	-0.97
ELP	49.28	50.19	-0.91	49.54	50.16	-0.62	49.07	49.76	-0.69	49.09	50.12	-1.03
BI	49.25	50.59	-1.34	49.52	50.37	-0.85	49.49	50.03	-0.54	49.33	50.35	-1.02
USH	49.19	50.54	-1.35	49.24	50.22	-0.98	48.62	49.98	-1.36	48.90	50.26	-1.36
SECTION V	Total - Block Started in 93			Total - Block Started in 93 & 94			Total - Block Started in 93, 94, & 95			Total - Block Started in 93, 94, 95, & 96		
E1	51.12	50.42	0.70	51.30	50.31	0.99	49.88	49.91	-0.03	49.28	50.16	-0.88
A1	47.21	48.52	-1.31	48.10	48.54	-0.44	48.67	48.34	0.33	47.76	48.64	-0.88
ELP	50.71	50.19	0.52	50.60	50.16	0.44	50.21	49.75	0.46	49.31	50.12	-0.81
BI	49.81	50.59	-0.78	50.65	50.37	0.27	49.77	50.03	-0.26	49.40	50.35	-0.95
USH	48.02	50.54	-2.52	50.48	50.22	0.26	49.67	49.98	-0.31	49.19	50.26	-1.07

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Table 4: Comparison of EOC Test Mean T-Scores
for Block Scheduling and Nonblock Scheduling Schools
(Adjusted by Previous Years' EOC Test Scores and Parent Education Level)

COURSES	EOC Test 1994				EOC Test 1995				EOC Test 1996			
	Block	Non block	Difference (B - NB)	SL	Block	Non block	Difference (B - NB)	SL	Block	Non block	Difference (B - NB)	SL
SECTION I	Block Started in 94											
E1	51.25	50.10	1.15	**	50.26	49.05	1.21	**	49.52	49.38	0.14	-
A1	48.12	48.42	-0.31	-	48.62	47.83	0.80	-	48.39	47.87	0.52	-
ELP	50.64	50.01	0.63	-	50.44	49.20	1.23	**	49.79	49.60	0.19	-
BI	51.05	49.95	1.11	**	49.87	49.11	0.75	*	49.85	49.50	0.35	-
USH	50.88	49.66	1.22	**	50.69	48.97	1.72	**	50.38	49.17	1.21	**
SECTION II	Before Block				Block Started in 95							
E1					50.38	49.05	1.32	**	49.67	49.38	0.29	-
A1					49.33	47.83	1.50	**	48.23	47.87	0.37	-
ELP					50.71	49.20	1.51	**	49.61	49.60	0.01	-
BI					50.44	49.11	1.33	**	49.76	49.50	0.26	-
USH					50.04	48.97	1.07	**	49.50	49.17	0.33	-
SECTION III	Before Block								Block Started in 96			
E1									49.59	49.38	0.21	-
A1									47.87	47.87	0.00	-
ELP									49.46	49.60	-0.14	-
BI									49.67	49.50	0.17	-
USH									49.32	49.17	0.15	-
SECTION IV	Total - Block Started in 94				Total - Block Started in 94, & 95				Total - Block Started in 94, 95, & 96			
E1	51.25	50.10	1.15	**	50.32	49.05	1.27	**	49.59	49.38	0.21	-
A1	48.12	48.42	-0.31	-	48.98	47.83	1.15	**	48.17	47.87	0.30	-
ELP	50.64	50.01	0.63	-	50.57	49.20	1.37	**	49.62	49.60	0.02	-
BI	51.05	49.95	1.11	**	50.15	49.11	1.04	**	49.76	49.50	0.26	-
USH	50.88	49.66	1.22	**	50.37	48.97	1.40	**	49.73	49.17	0.56	*

* Significant level at .05
** Significant level at .01

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Table 5: Comparison of EOC Test Mean T-Scores
for Blocked Schools with Different Lengths of Time in Block Scheduling
(without Adjustment)

MEAN T SCORES	2 years vs. 1 Year				Block 94 vs. Block 96				Block 95 vs. Block 96			
					Block 94	Block 96	Difference (B94 -B96)	SL	Block 95	Block 96	Difference (B95 -B96)	SL
EOC Test 1995												
E1	50.08	49.70	0.38	-								
A1	48.82	48.62	0.20	-								
ELP	50.52	50.08	0.45	-								
BI	49.65	49.74	-0.10	-								
USH	50.33	49.39	0.94	-								
EOC Test 1996	3 Years vs. 2 Years				3 Years vs. 1 Year				2 Years vs. 1 Year			
E1	49.75	49.20	0.55	-	49.75	49.08	0.67	-	49.20	49.08	0.12	-
A1	48.49	47.55	0.94	-	48.49	47.67	0.82	-	47.55	47.67	-0.12	-
ELP	50.10	49.15	0.95	-	50.10	49.09	1.01	-	49.15	49.09	0.06	-
BI	49.88	49.21	0.66	-	49.88	49.33	0.54	-	49.21	49.33	-0.12	-
USH	50.16	49.04	1.12	-	50.16	48.90	1.26	-	49.04	48.90	0.14	-

Table 6: Comparison of EOC Test Mean T-Scores
for Blocked Schools with Different Lengths of Time in Block Scheduling
(Adjusted by Previous Years' EOC Test Scores and Parent Education Level)

MEAN T SCORES	Block 94 vs. Block 95				Block 94 vs. Block 96				Block 95 vs. Block 96			
	Block 94	Block 95	Difference (B94 -B95)	SL	Block 94	Block 96	Difference (B94 -B96)	SL	Block 95	Block 96	Difference (B95 -B96)	SL
EOC Test 1995	2 Years vs. 1 Year											
E1	50.26	50.38	-0.12	-								
A1	48.62	49.33	-0.70	-								
ELP	50.44	50.71	-0.28	-								
BI	49.87	50.44	-0.58	-								
USH	50.69	50.04	0.64	-								
EOC Test 1996	3 Years vs. 2 Years				3 Years vs. 1 Year				2 Years vs. 1 Year			
E1	49.52	49.67	-0.15	-	49.52	49.59	-0.07	-	49.67	49.59	0.08	-
A1	48.39	48.23	0.15	-	48.39	47.87	0.52	-	48.23	47.87	0.37	-
ELP	49.79	49.61	0.18	-	49.79	49.46	0.33	-	49.61	49.46	0.15	-
BI	49.85	49.76	0.09	-	49.85	49.67	0.17	-	49.76	49.67	0.09	-
USH	50.38	49.50	0.88	*	50.38	49.32	1.06	**	49.50	49.32	0.18	-

* Significant level at .05
** Significant level at .01

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